

Serial No.: 10/717,630
Atty. Docket No.: P68978US0

IN THE SPECIFICATION:

On page 2, please amend the second paragraph, beginning on line 14, as follows:

--For quite some time, the polymer industry has sought to process PET polymers into a pellet shape using underwater pelletizer systems. The A major drawback of using underwater pelletizing, as well as other pelletizing systems, for processing PET into pellet shapes is the typically amorphous condition of these pellets when they leave the dryer of the underwater pelletizing system. The amorphous nature of the resulting pellet is caused by the fast cooling of the PET material once introduced into the water flow in the water box of underwater pelletizer and while the water and pellet slurry is being transported by appropriate piping to the dryer.--

On page 3, please amend the first paragraph, beginning on line 1, as follows:

--End users of PET polymer pellets typically require that the pellets be in a crystalline state, rather than an amorphous state, principally for two reasons, both relating to the fact that the end user wants to process the PET pellets in a substantially dry condition, ~~without any~~ with zero or near zero

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water content. First, PET polymers are very hygroscopic, and crystalline PET pellets absorb considerably less moisture during shipment and storage than amorphous PET pellets. Accordingly, crystalline PET pellets can be dried to the requisite zero or near zero moisture content more easily by the end user. Second, the temperature required to completely dry PET polymers is higher than the temperature at which amorphous PET pellets convert to the crystalline form. Therefore, when drying amorphous PET pellets, it is necessary to first achieve crystallization at the requisite lower temperature before raising the temperature to the drying temperature. Otherwise, the amorphous PET polymer pellets may agglomerate and destroy the pellet form.--

On page 5, please amend the first full paragraph and the second paragraph thereafter, beginning on line 3, as follows:

--Typically, increasing the water flow through the water box of the underwater pelletizer and increasing the water temperature, along with pipe dimensional changes and reducing the distance between the pelletizer and dryer unit, does not help to increase sufficiently maintain the pellet temperature sufficiently. Under such circumstances, the PET pellets still leave the dryer at a temperature, usually below 100° C, which is

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below the temperature (about 135° C) at which crystallization can occur ~~crystalline pellets can form~~. Accordingly, it is necessary to significantly increase the speed of pellet flow from the exit of the underwater pelletizer and into and through the dryer.

This increased pellet speed is accomplished in accordance with the present invention by injecting air or other suitable gas into the transportation piping leading to the dryer just after the cut pellets and water slurry exit the water box of the pelletizer unit. It has been found that the injected air helps to separate the water from the pellets in the transportation piping, significantly speeds up the transport of the pellets to the dryer and can serve to generate a pellet temperature exiting the dryer at greater than about 145° C. While the PET polymer pellets may come out of the dryer in an amorphous condition, there is still sufficient heat remaining inside the pellets for to start the crystallization process to occur ~~and finally produce~~ ~~crystalline~~ ~~pellets~~ without the necessity of the second heating stage heretofore used to make PET pellets using underwater pelletizing systems.--

On page 6, please amend the last paragraph, beginning on line 19, as follows:

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--It has been found that crystalline PET pellets can be formed in accordance with the method and apparatus of the present invention, with a mean temperature of the PET pellets exiting the dryer above about 145° C, if the residence time of the pellets from the point of formation by the cutter blades at the die face to the exit from the centrifugal dryer is reduced by the injection of high velocity air or other gas into the slurry line. This shortened residence time should assure that the PET pellets will exit the dryer of the underwater pelletizing system at a mean temperature greater than 145°C and will retain sufficient heat inside the pellets to initiate the desired crystallization in and cause the amorphous pellets, particularly to form crystalline pellets, if the pellets are properly stored in a heat insulating container. Hence, the necessity of a secondary heating step is eliminated.--

On page 7, please amend the first, second and third full paragraphs, beginning on line 9, as follows:

--Accordingly, it is an object of the present invention to provide a method and apparatus for processing PET polymers in an underwater pelletizing system which can produce

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crystallization in the crystalline PET pellets after that exiting from the dryer.

It is another object of the present invention to provide a method and apparatus for producing crystallization in crystalline PET polymer pellets utilizing an underwater pelletizing system without the necessity of an expensive secondary heating stage to convert amorphous PET pellets to crystalline PET pellets.

It is a further object of the present invention to provide a method and apparatus for underwater pelletizing PET pellets polymer in which the pellets are transported through the equipment at a sufficiently rapid speed so that the mean temperature of the pellets exiting the dryer is greater than about 145° C.--

On page 7, after the third paragraph, please insert the following new paragraph, beginning on line 24, as follows:

--A still further object of the present invention is to provide a method and apparatus for the underwater pelletizing of PET polymer in accordance with the preceding object in which a gas is injected into the water and pellet slurry exiting the

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pelletizer to produce a water vapor mist form of slurry handling, thereby providing better heat retention.--

On page 8, please amend the first paragraph, beginning on line 1, as follows:

--It is yet another object of the present invention to provide a method and apparatus for producing PET polymer pellets using an underwater pelletizing system in which the pellets exiting the dryer have sufficient heat remaining inside the pellets ~~to initiate and complete the~~ for crystallization of the PET pellets under to occur, a process that may include proper conditions of storage, if necessary.--

On page 11, please amend the last paragraph, beginning on line 16, as follows:

--The air is conveniently injected into the slurry line 30 at point 70 using a conventional compressed air line typically available in most manufacturing facilities, such as with a pneumatic compressor, and a standard ball valve sufficient to produce a high velocity air flow in the slurry line 30. This is readily achieved by a volume of air in the range of 100 m³/hour through a standard ball valve at a pressure of 8 bar into a

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slurry line comprising a standard 1.5 inch pipe. This high velocity air (or other gas) when contacting the slurry water and hot pellets generates a water vapor mist. The pellets tend to disperse to the inside circumference of the pipe as they move rapidly therethrough to the dryer. It is estimated that the volume of air in the overall gas/slurry mixture is on the order of 98% - 99% or more by volume of the overall mixture. The air injected into the slurry line 30 at point 70 increases the speed of the pellet flow from the water box 16 to the exit 34 of the dryer 32 to a rate of less than one second.--

On page 12, please amend the first full paragraph, beginning on line 9, as follows:

--The mean temperature of the PET polymer pellets exiting the dryer 32 at 34 in accordance with the present invention should be above about 145° C. At this temperature, the PET pellets will retain sufficient heat inside the pellets to initiate crystallization therein, ~~and cause the PET pellets to fully transform to a crystalline state,~~ without the necessity of a secondary heating step. If desired or necessary, the PET polymer pellets exiting the dryer 32 can be placed in appropriate heat insulating containers so that the retained heat in the PET

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pellets ~~completes~~ is sufficient to complete the desired crystallization process, before the pellets cool below the crystallization temperature.--